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Weiss

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(54) **SIDE-EMITTING FIBER OPTIC POSITION SENSOR**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 74 days.

This patent is subject to a terminal disclaimer.

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(52) **U.S. Cl.** **250/227.11**; 385/12

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See application file for complete search history.

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(57) **ABSTRACT**

A side-emitting fiber optic position sensor and method of determining an unknown position of an object by using the sensor. In one embodiment, a concentrated beam of light source illuminates the side of a side-emitting fiber optic at an unknown axial position along the fiber's length. Some of this side-illuminated light is in-scattered into the fiber and captured. As the captured light is guided down the fiber, its intensity decreases due to loss from side-emission away from the fiber and from bulk absorption within the fiber. By measuring the intensity of light emitted from one (or both) ends of the fiber with a photodetector(s), the axial position of the light source is determined by comparing the photodetector's signal to a calibrated response curve, look-up table, or by using a mathematical model. Alternatively, the side-emitting fiber is illuminated at one end, while a photodetector measures the intensity of light emitted from the side of the fiber, at an unknown position. As the photodetector moves further away from the illuminated end, the detector's signal strength decreases due to loss from side-emission and/or bulk absorption. As before, the detector's signal is correlated to a unique position along the fiber.

14 Claims, 11 Drawing Sheets